

Update on generic and specific nomenclature in *Paracaleana* (Drakaeinae), *Caladeniinae* and a new name in *Caladenia* (Orchidaceae)

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Abstract

Hopper, S.D. & Brown, A.P. Update on generic and specific nomenclature in *Paracaleana* (Drakaeinae), *Caladeniinae* and a new name in *Caladenia* (Orchidaceae). *Nuytsia* 30: 279–285 (2019). Accepting guidance on stability of names from the Preamble to successive International Codes of Botanical Nomenclature, and in the interests of minimizing name changes consistent with present scientific evidence, we propose that the Australian orchid genus *Paracaleana* should be maintained as a distinct genus from *Caleana*, and that *Caladenia* remains best recognised as distinct from *Cyanicula*, *Ericksonella*, *Pheladenia*, *Glossodia* and *Elythranthera*. Recent proposals to lump these genera unnecessarily creates new names in the absence of compelling new scientific evidence to do so. A new name, *Caladenia varians* Hopper & A.P.Br., is erected to replace *C. vulgata* Hopper & A.P.Br. The type of *C. vulgata* matches *Caladenia incensum* Hopper & A.P.Br., and the former species is therefore rendered synonymous with the latter.

Introduction

We have dealt previously with the complex history and ongoing taxonomic upheaval regarding generic and specific concepts in Australian orchids, especially in the subtribes *Caladeniinae* and *Thelymitrinae*/*Drakaeinae* (Hopper & Brown 2004, 2006; Hopper 2009). We have steadfastly considered that nomenclatural changes should be minimized consistent with the scientific evidence, as proposed in the Preamble to successive International Codes of Botanical Nomenclature, which aims at:

‘... the provision of a stable method of naming taxonomic groups, avoiding and rejecting the use of names that may cause error or ambiguity or throw science into confusion. Next in importance is the avoidance of the useless creation of names.’ (McNeil *et al.* 2012).

Others working on Australian orchids hold opposing views to this maxim, and continue to change names unnecessarily in our view. Moreover, some (not all) Australian herbaria have accepted this latest round of superfluous name changing, and international lists are beginning to follow suit (e.g. World Checklist of Selected Plant Families, <https://wvsp.science.kew.org>, accessed 19 February, 2019). Here, we briefly address this issue and provide a necessary new name in *Caladenia* R.Br.

Paracaleana (Drakaeinae)

Miller and Clements (2014) analysed ITS rDNA sequences of 25 Thelymitrinae/Drakaeinae species and obtained strong support for several genera as monophyletic, including the sisters *Paracaleana* Blaxell and *Caleana* R.Br. Essentially, increased taxon sampling and evidence from new DNA sequences reported by Miller and Clements (2014) confirmed the phylogenetic relationship of these two genera already established as sisters when we revised *Paracaleana* (Kores *et al.* 2001; Hopper & Brown 2006). Yet Miller and Clements (2014), despite clear evidence of reciprocal monophyly, chose to synonymise *Paracaleana* into *Caleana*, and Clements (in Miller and Clements 2014) made the 11 new combinations accordingly. This, in our view, is in contravention of the aim of avoiding the useless creation of names (McNeil *et al.* 2012). In the interests of nomenclatural stability, we continue to recognise *Paracaleana* as a genus distinct from *Caleana*, and recognise the following species in *Paracaleana*:

Paracaleana alcockii Hopper & A.P.Br.

Paracaleana brockmanii Hopper & A.P.Br.

Paracaleana disjuncta D.L.Jones

Paracaleana dixonii Hopper & A.P.Br.

Paracaleana ferricola A.P.Br. & G.Brockman (see Brown & Brockman 2019)

Paracaleana gracilicordata Hopper & A.P.Br.

Paracaleana granitica Hopper & A.P.Br.

Paracaleana hortiorum Hopper & A.P.Br.

Paracaleana lyonsii Hopper & A.P.Br.

Paracaleana minor (R.Br.) Blaxell

Paracaleana nigrata (J.Drummond ex Lindl.) Blaxell

Paracaleana parvula Hopper & A.P.Br.

Paracaleana terminalis Hopper & A.P.Br.

Paracaleana triens Hopper & A.P.Br.

Genera and species in Caladeniinae

Clements *et al.* (2015) enlarged previous sampling of Caladeniinae species to 54 in a molecular phylogenetic study of DNA sequences based on nuclear ribosomal ITS and five plastid regions. This study, again, confirmed the phylogenetic relationships of genera and subgenera already established for the *Caladenia* alliance based on DNA analyses available when we published our latest formal taxonomic review (Hopper & Brown 2004; Hopper 2009). Strong bootstrap support was evident at these taxonomic levels except for the unresolved sister relationship of the two subgenera of *Cyanicula* Hopper & A.P.Br. Further study involving next generation sequencing is required to confirm or falsify the sister relationship of these subgenera. Until this is done we see no case for formally changing names.

At a higher taxonomic level, surprisingly given earlier narrow concepts of *Caladenia* and formal changes effected by Jones and Clements (2001), Clements *et al.* (2015) recently chose to enlarge our concept of *Caladenia* to also include *Cyanicula*, *Ericksonella* Hopper & A.P.Br., *Pheladenia* D.L.Jones & M.A.Clem., *Glossodia* R.Br. and *Elythranthera* A.S.George. Again, we see this as another example where the avoidance of the useless creation of names (McNeil *et al.* 2012) has not been practised. We reject these unnecessary nomenclatural changes, and maintain our view of generic and subgeneric relationships in the *Caladenia* alliance as previously published (Hopper & Brown 2004; Hopper 2009) in the interests of minimizing name changes consistent with present scientific evidence.

Clements *et al.* (2015) provide some new morphological evidence in support of their taxonomic conclusion for lumping several currently recognised genera into *Caladenia*. Their rationale was to

examine sequentially each character said to be diagnostic of genera and to plot such characters onto their phylogeny. While we are content with their ascription of most characters across clades, we disagree with their treatment of the swollen barrel-shaped basal cell in trichomes. Rather than treat this as a single character, Clements *et al.* (2015) combined it with the presence or absence of glands on the trichome. This enabled them to argue that the synapomorphy for *Caladenia/Ericksonella* as we recognised the clade was, in fact, rampantly homoplasious. The presence/absence of glands on trichomes is indeed homoplasious. The presence of a swollen barrel-shaped basal cell, in contrast, is a synapomorphy for *Caladenia + Ericksonella*. We decided to separate *Ericksonella* from *Caladenia* on DNA evidence, which is even more compelling in the study with increased taxon sampling by Clements *et al.* (2015).

We are not as troubled as Clements *et al.* (2015) were that generic-level characters of value in combination in the Caladeniinae were homoplastic when examined individually. The practical issue of identification of genera we recognise is easily achieved when suites of characters are considered, rather than individual characters.

The challenge with generic delimitation in the Caladeniinae is that individual characters are rarely synapomorphic, and hence genera may be recognised in different ways. Molecular phylogeny has provided scientific rigour in establishing genetic relationships, particularly as the sampling of taxa and genetic regions have increased. Clements *et al.* (2015) make a worthwhile contribution in this context. However, where to cut the phylogenetic tree at formal taxonomic levels remains arbitrary and debateable in several cases as their paper reinforces. This is why we place emphasis on nomenclatural stability when present scientific evidence remains equivocal. We suspect that next generation sequencing holds hope for resolution of many of the contentious parts of the Caladeniinae tree. It is premature to lump genera as Clements *et al.* (2015) have done, just as it was to split *Caladenia* so finely in an earlier paper (Jones & Clements 2001).

After a period of some stability in species concepts in the *Caladenia* alliance following publication of our papers (Hopper & Brown 2001, 2004), Brundrett (2014) foreshadowed another phase of taxon lumping may commence. He did not define the species concept that would be used to validate such revisionary work, either in text or the Glossary. It was intimated that many species we described as new taxa through applying the biological species concept (Hopper & Brown 2001, 2004; Hopper 2009) were problematic morphologically or genetically. Terms like ‘endless forms’, borrowed from Charles Darwin, were used to create an unquantified impression that decisions on the status of taxa were essentially arbitrary and lack scientific rigour. However, Brundrett (2014) used only a selection of the diagnostic taxonomic characters we identified in our taxonomic revisions, reducing descriptions into a shorter list of readily observed characters irrespective of their value for identifying individual taxa. Until a more rigorous revision is undertaken, testing species concepts against explicit definitions with modern next generation DNA sequencing markers and detailed population morphometrics, we remain content in recognising taxa hitherto named by us and more recently by Brown and Brockman (2007, 2015).

A new name in *Caladenia*

One taxon that does need formal attention now is *Caladenia vulgata* Hopper & A.P.Br. Inadvertently, the holotype of this species was incorrectly chosen and clearly belongs to *C. incensum* Hopper & A.P.Br. We effect that synonymy here, and choose a new name, *Caladenia varians* Hopper & A.P.Br. for the taxon previously regarded as *C. vulgata*.

Caladenia incensum Hopper & A.P.Br., *Nuytsia* 14(1/2): 241 (2001). *Calonema incensum* (Hopper & A.P.Br.) D.L.Jones & M.A.Clem., *Orchadian* 13(10): 455 (2002), *nom. inval.*; *Calonemorchis incensa* (Hopper & A.P.Br.) D.L.Jones & M.A.Clem., *Orchadian* 14(1): 36 (2002); *Jonesiopsis incensa* (Hopper & A.P.Br.) D.L.Jones & M.A.Clem., *Orchadian* 14(4): 182 (2002). *Typus*: Chiddarcooping Hill Nature Reserve, near southern boundary, 30°54'S, 118°41'E, Western Australia, 17 August 1988, A. Brown 829 (*holo*: PERTH 01708112; *iso*: AD 156477, CANB 556721, K, MEL 2279957, NSW 520141).

Caladenia vulgata Hopper & A.P.Br., *Nuytsia* 14(1/2): 280 (2001), *pro parte* as to type. *Typus*: Kalbarri National Park, 17 km south of Eurardy Homestead, 13.1 km north of Murchison River Bridge, 500 m south-west of Highway, 27°43'S, 114°40'E, Western Australia, 23 August 1983, S.D. Hopper 3330 (*holo*: PERTH 00273600; *iso*: AD 168970, CANB 598564.1, K).

Caladenia varians Hopper & A.P.Br., *sp. nov.*

Typus: Coorow Greenhead Road, 25 km west of Midlands Road. south-west of Coorow, Western Australia, 4 September 2010, G. Brockman GBB 2621 (*holo*: PERTH 08420068; *iso*: CBG).

Caladenia vulgata Hopper & A.P.Br., *Nuytsia* 14(1/2): 280 (2001), *pro parte* not as to type. *Caladenia varians* Hopper & A.P.Br. subsp. *varians*, in N. Hoffman & A. Brown, *Orchids of South-West Australia*, 2nd edn. p. 33 (1992), *nom. nud.*

Illustrations. N. Hoffman & A. Brown, *Orchids of South-West Australia*, 2nd edn, p. 33 [as *Caladenia varians* subsp. *varians*] (1992); N. Hoffman & A. Brown, *Orchids of S-W Austral.*, rev. 2nd edn with suppl., p. 33 (1998) and 3rd edn, p. 37 (2011); A. Brown, P. Dundas, K. Dixon & S. Hopper, *Orchids of W. Austral.*, p. 36, Figure A (2008); G. Backhouse, *Spider-orchids - the Genus Caladenia and its Relatives in Austral.*, p. 258–259 (2011) and rev. 2nd edn, p. 276–277 (2018); A. Brown, K. Dixon, C. French & G. Brockman, *Field Guide to the Orchids of W. Austral.*, p. 72 (2013); N. Hoffman, A. Brown & J. Brown, *Orchids of S-W Austral.*, 4th edn. p. 38 (2019) [all as *C. vulgata*].

Plants solitary or in small clumps. *Leaf* 50–220 mm long, 3–5 mm wide, linear, erect, incurved in cross section, pale green, the basal 1/3 usually irregularly blotched with red-purple. *Scape* 150–300 mm tall. *Flowers* 1 to 3, 70–100 mm across, cream, with pale maroon lines, spots and blotches; floral odour faintly sweet to putrid. *Petals and sepals* linear-lanceolate, scarcely glandular-hirsute on the outside and glabrous on the inside in the basal 1/5 to 1/4 then abruptly narrowing to a red-black, densely glandular-hairy, long-acuminate filamentous apex lacking a swollen osmophore. *Dorsal sepal* 45–100 mm long, 2–3 mm wide, erect and slightly incurved. *Lateral sepals* 50–110 mm long, 2–4 mm wide, spreading obliquely downwards near the base and pendulous towards the apex. *Petals* 45–100 mm long, 2–3 mm wide, spreading horizontally near the base and pendulous towards the apex. *Labellum* obscurely 3-lobed, cream with pale to deep red stripes, spots and blotches, stiffly articulated on a claw 1–1.5 mm wide; lamina 10–15 mm long, 7–11 mm wide, narrowly triangular (rarely rhomboidal) in outline, erect with entire margins in the basal 1/3, nearly horizontal in middle 1/3 and apical 1/3 prominently recurved; lateral lobes with broadly truncate to triangular forwardly uncinuate cream to red-marked marginal calli which are decrescent towards the mid lobe; lamina calli cream, often with pale red markings, dull on top, broadly to narrowly anvil-shaped, the longest c. 1 mm tall, in 8–12 pairs in two rows extending over about 1/2 the length of the labellum and slightly decrescent towards the apex. *Column* 8–12 mm long, 4–6 mm wide, narrowly-winged, opaque cream with pale red stripes and blotches, sparsely hirsute with short glandular hairs on outer surface. *Anther* 2–3 mm long, 2–3 mm wide, greenish yellow. *Pollinia* >2 mm long, kidney-shaped,

flat, yellow, mealy. *Stigma* 2–2.5 mm long, 2–2.5 mm wide. *Capsule* not seen. (Figure 1)

Diagnostic features. *Caladenia varians* may be distinguished from all other members of the genus by the following combination of characters: Flowers cream, with pale maroon lines, spots and blotches; Petals and sepals with a red-black, densely glandular-hairy, long-acuminate filamentous apex lacking a swollen osmophore; Labellum lateral lobes with broadly truncate to triangular forwardly uncinately marginal calli; lamina calli broadly to narrowly anvil-shaped in 8–12 pairs in two rows extending over about 1/2 the length of the labellum.

Selected specimens examined. WESTERNAUSTRALIA: Coolinup Rd, 3 km S of Kettles Road. Track follow power line to W, 23 Sep. 2004, *G. Brockman* 1417 (PERTH); 500m SE of Beaumont Wheat facility; Beaumont Nature Reserve, 23 Sep. 2004, *G. Brockman* GBB 1477 (PERTH); Reserve 10147, Robinson Rd, Woodanilling, 8 Oct. 2014, *G. Byrne* 5274 (PERTH); 16 miles NW of Badgingarra, 1 Sep. 1966, *A.S. George* 7805 (PERTH); 22 km SSE of Kalbarri, 45 km WNW of Binu, 24 Aug. 1983, *S.D. Hopper* 3342 (PERTH); 26 km ENE of Wilga siding, 6 Oct. 1983, *S.D. Hopper* 3477 (PERTH); 300 metres E of Mandurah-Fremantle Rd on Paganoni Rd, 12 km NNE of Mandurah, 12 Sep. 1984, *S.D. Hopper* 4136 (AD, CANB, PERTH); Yalgorup National Park, 4.1 km W of Mandurah – Bunbury Rd on Preston Beach Rd, 12 Sep. 1984, *S.D. Hopper* 4145 (AD, CANB, K, PERTH); Yalgorup National Park, 1.2 km W of Mandurah - Bunbury Rd on Preston Beach Rd, 12 Sep. 1984, *S.D. Hopper* 4149 (CANB, PERTH); 26 km NW of Kojonup, intersection of Collie – Changerup and Stirlings Rd, 11 Sep. 1985, *S.D. Hopper* 4543 (PERTH); Dragon Rock Nature Reserve (36128), 31 km N of Newdegate,



Figure 1. *Caladenia varians*. A – flowers showing their cream and pale maroon colouration and pendulous petals and lateral sepals with densely glandular-hairy, long-acuminate filamentous apices; B – labellum, showing the broadly truncate to triangular forwardly uncinately marginal calli and broadly to narrowly anvil-shaped lamina calli. Photographs by A.P. Brown.

13 Sep. 1985, *S.D. Hopper* 4567 (CANB, PERTH); Kalbarri Road, c. 9 km WSW of Murchison House Station turnoff, 8 Aug. 1986, *S.D. Hopper* 5178 (PERTH); Great Northern Hwy, 1 km NNE of Wubin, 23 Aug. 1988, *S.D. Hopper* 6504 C (PERTH); SE foot and W foot of Totadgin Rock, c. 47 km NE of Kellerberrin, 14 Sep. 1988, *S.D. Hopper* 6610 (PERTH); c. 12 km W of Z Bend Gorge, Kalbarri National Park, and 10 km SSW of T-junction on road to Z Bend Gorge, 8 Aug. 1990, *S.D. Hopper* 7815 (PERTH); Bullsbrook Nature Reserve, 1 km N of Pearce, 9 Aug. 1992, *G.J. Keighery* 13514 (PERTH); Pikaring West Nature Reserve, Old Beverley Rd; ca 25 km E Quairading, 18 Aug. 1998, *G.J. Keighery* 16388 (PERTH); Bridge crosses salty creekline on the Coorow-Greenhead Rd 7.6 km E of the junction of Carger Rd and the Coorow-Greenhead Rd, 29 Aug. 2014, *R. Phillips* 0269 (PERTH); Peak Charles car park area, 6 Aug. 1978, *D.R. Voigt* 46pp (PERTH).

Phenology. Flowering from August to October. Fruiting from October to November.

Distribution and habitat. Widespread throughout the south-west from north of Kalbarri to Augusta and eastwards to Condingup. Favours sandy soils in a range of communities including coastal heath, inland mallee heath, woodlands and forests.

Conservation status. Not considered rare or under immediate threat.

Etymology. From the Latin *varians* (varying), in reference to the variable morphology of the species over its very large geographic range.

Affinities. *Caladenia varians* is most similar to *C. pendens* Hopper & A.P.Br. from which it may be distinguished by its shorter petals 45–100 × 2–3 mm (*cf.* 60–120 × 3–5 mm in *C. pendens*), generally smaller labellum 10–15 × 7–11 mm (*cf.* 11–19 × 9–12 mm in *C. pendens*) and smaller column 8–12 × 4–6 mm (*cf.* 10–15 × 5–7 mm in *C. pendens*). It is also similar to *C. exilis* Hopper & A.P.Br. from which it may be distinguished by its larger labellum 10–15 × 7–11 mm *cf.* (8–12 × 5–7 mm in *C. exilis*).

Caladenia varians may be found growing with *C. nobilis* Hopper & A.P.Br., which has much larger flowers with a broader labellum 12–25 × 12–16 mm and larger column 13–18 × 5–10 mm. It may also be found with *C. hiemalis* Hopper & A.P.Br., which generally has shorter petals 35–60 mm long and an earlier flowering season between June and August, and with *C. meridionalis* Hopper & A.P.Br., which also flowers earlier (June–August) and has stiffly held petals and sepals with dark glandular apices. *Caladenia meridionalis* is also confined to the south coast whereas *C. varians* is widespread from Kalbarri to Condingup.

Northern populations of *C. varians* may grow near to *C. incensum* but the latter species differs in its broader leaf 4–15 mm across, broader tepals 3–6 mm across, short squat calli and its preference for heavier (clay-loam) soils. To the north-west of Northampton, *C. varians* grows with *C. elegans* Hopper & A.P.Br. which differs in its pale yellow colouration, thicker more squat calli and its preference for winter-wet clay soils.

Notes. *Caladenia varians* occasionally hybridises with *C. nobilis* on the Swan Coastal Plain and with *C. wanosa* A.S.George in Kalbarri National Park. Rare hybrids of *C. varians* and *C. drakeoides* Hopper & A.P.Br. found near Pithara are formally named *Caladenia ×hopperi* J.M.H.Shaw (Shaw 2014).

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